Investigating the factors influencing the adoption of m-banking: A cross cultural study

Abstract

Purpose – Little is known about the adoption of mobile banking technologies in emerging Asian economies. This paper aims to empirically examine the motivators that influence a consumer's intentions to use mobile banking.

Design/methodology/approach – A web-based survey was employed to collect data from 348 respondents, split across Thailand and Australia. Data were analyzed by employing exploratory and confirmatory factor analyses, path and invariance analyses.

Findings – The fit of the CFA for our studies conducted both in Thailand /Australia was acceptable, with $\chi2= 187.811/202.466$, df= 105/105, $\chi2$/df = 1.789/1.928, (p < .01), (CFI) = 0.954/0.964, (RMSEA) = 0.062/.073. The findings indicate that for Australian consumers, perceived ease of use, perceived usefulness and perceived risk were the primary determinants of mobile banking adoption. For Thai consumers, the main factors were perceived usefulness, perceived risk and social influence. National culture was found to impact key antecedents that lead to adoption of m-banking.

Research limitations/implications – The actual variance explained by our study's model was higher in Australia (59.3%) than for Thailand (23.8%), suggesting future research of m-banking adoption in emerging Asian cultures.

Practical implications – We identify the important factors consumers consider when adopting m-banking. The findings of this research give banking organisations a foundational model that can be used to support m-banking implementation.

Originality/value – Our study is perhaps the first to examine and compare the intention to adopt m-banking across Thai and Australian consumers, and responds to calls for additional research that generalises m-banking and m-services acceptance across cultures. This study has proposed and validated additional constructs that are not present in the original SST Intention to Use model.

Introduction

Rapid innovation and increasing competition has revolutionised the services landscape, resulting in providers shifting from traditional face-to-face encounters, to ones that are technology-based, in order to increase efficiency and decrease operating costs (Laukkanen & Lauronen, 2005; Leung & Matanda, 2013). Over the past decade, the emergence of mobile self-service technologies (SSTs) has provided banking organisations greater opportunities to capture new markets (Gummerus & Pihlstrom, 2011). Recent studies have posited that consumer preference for mobile banking (m-banking) over incumbent forms doubled from 2008 to 2012 (Spertus, 2012), with Asia predicted to have the largest number of m-banking users by 2017 (Shen, 2012). Importance of the Asian market is demonstrated by growth in bank marketing research from within this region (Hong & Lee, 2012; Lee, 2009; Phan & Ghantous, 2013).

Previous research investigating the adoption of self-service technologies (SSTs) have only focussed on functional and psychological drivers while overlooking social and cultural factors (Dahlberg, Mallat, Ondrus & Zmijewska, 2008; Venkatesh, Morris, Davis, & Davis, 2003). Yet, SSTs and mobile services (m-services) have different antecedents for adoption (Curran & Meuter, 2005). Further, most research on technology adoption has been conducted in the United States and Western Europe (Arvidsson, 2014; Constantiou, Damsgaard & Knutsen, 2006; Laukkanen & Pasanen, 2008; Nilsson, 2007), while only limited work exists in developing economies (Alsheikh & Bojei, 2012; Laukkanen & Kiviniemi, 2010; Lee & Chung, 2009). This is problematic, given the predicted growth of m-banking users in Asian nations. Past studies have indicated that technology adoption may be moderated by national culture (Pavlou & Chai, 2002; Straub, Keil, & Brenner, 1997), and with the banking industry's long-term focus toward using mobile SSTs, a deeper understanding of adoption across cultures is considered important. In order to fill these gaps, our study establishes the motivators and inhibitors that influence consumers' intentions to use m-banking services across two distinct national cultures, Australia and Thailand.

The following research questions frame the investigation; what are the key motivators and inhibitors that influence consumers' intention to use m-banking services; and do the motivators and inhibitors of m-banking use differ between predominantly collectivist (Thai) and individualistic (Australia) national cultures? This study conceptualizes culture as being a 'national trait' and does not test culture at an individual level (Gouveia & Ros, 2000). This

work contributes to a deeper understanding of m-banking adoption by responding to calls for research into technology adoption and use in emerging markets, in this case Thailand (Agarwal, Rastogi, & Mehrotra, 2009; Chemingui & lallouna, 2013; Ladhari & Leclerc, 2013). Further, we address the appeals for additional research that generalises m-services acceptance across cultures (Gummerus & Pihlstrom, 2011; Laukkanen & Kiviniemi, 2010; Wang, Harris, & Patterson, 2012) by bringing together a number of constructs, developing a robust model and examining the influence of national culture.

Literature Review

The service encounter has been conventionally defined as a social, interpersonal dyadic human interaction between a customer and front-line staff (Soloman, Surprenant, Czepial, & Gutman, 1985). However, a broader conceptualisation of the service encounter has emerged; that being the period of time during which a consumer directly interacts with a service (Zinn, 1993). This definition focuses less on the interpersonal interaction and suggests that service encounters can occur without any human-to-human interaction. These new encounters have generally been accompanied by supporting technologies, referred to as self-service technologies (SSTs) (Swartz & Iacobucci, 2000).

Building upon both Fishbein and Ajzen's (1975) Theory of Reasoned Action and Ajzen's (1991) Theory of Planned Behaviour, recent studies investigating technology adoption have used the Technology Acceptance Model (TAM) (Davis, Bagozzi, & Warshaw, 1989). The TAM is widely regarded as having solid explanatory power of the variance in a user's behavioural intentions related to m-service adoption (Taylor & Todd, 1995). However, while the parsimonious nature of the TAM is one of its biggest strengths, there have been calls to extend the model to improve its explanatory powers (Venkatesh & Davis, 2000). For example, the model does not include any effects related to subjective norms or the influence of peers (Curran & Meuter, 2005; Mathieson, 1991). We have responded to these calls, like others who have chosen to use the TAM as a foundation, by developing our own extended model (Chong, Ooi, Lin, & Tan, 2010; Chong, Ooi, Lin, & Bao, 2011; Kuo & Yen, 2009; López-Nicolás, Molina-Castillo, & Bouwman, 2008; Song, Parry & Kawakami, 2009).

The simplicity of the TAM is that it relies on two key factors to explain consumers' intentions to use; perceived usefulness (PU) and perceived ease of use (PEOU) (Lopez-

Nicolas, Molina-Castillo, Bouwman, 2008). As a result, most studies have proposed extended or modified versions of the TAM, and consequentially several different tested antecedents to adoption have resulted. This lead to Venkatesh el at (2003) producing the unified theory of acceptance and use of technology (UTAUT) model. The UTAUT model posits that four key factors (performance expectancy, effort expectancy, social influence and facilitating conditions) are direct determinants of technology usage intention and behaviour. However, as argued, SSTs and m-services have different antecedents for adoption (Curran and Meuter, 2005). As such, the Self-Service Technology Intention to Use Model was developed specifically for banking SSTs (Curran and Meuter, 2005). The SST Intention to Use model, differed from TAM and UTAUT, finding that ease of use, usefulness, perceived risk and a need for interaction were key antecedents that lead to the adoption of banking SSTs. The study also found that different banking SSTs (i.e. automatic teller machines, phone banking and internet banking) impacted on the significance of these antecedents.

Previous studies of technology adoption have focused on hedonic values, such as looking at the degree of enjoyment reported by users as they adopt m-services (Nysveen, Pedersen, & Thorbjørnsen, 2005; Revels, Tojib, & Tsarenko, 2010). Other studies have examined the functional or utilitarian drivers of m-services adoption. Specifically, Shierz *et al* (2010) found that functional drivers such as compatibility, the level of mobility and perceived security were strong indicators of m-services adoption. In an Asian context, Chong *et al* (2011) concluded that variety, quality of services and cost were major determinants of the adoption of m-services. These studies, along with others, have concluded that the type of m-service affects the antecedents that lead to adoption (López-Nicolás, et al., 2008). As such, we examined the specific context of m-banking service adoption. Further, since current adoption models do not adequately explain all of the variance in use, we argue there are potentially other underlying constructs that remain unexplored (Rao & Troshani, 2007). Hence, an aim of our research is to build upon the TAM in order to develop a model with greater explanatory power across national cultures.

Conceptualizing culture
Buzzell (1968) described the conceptualization of culture as a convenient catchall for the many differences in market structures and behaviours that cannot be readily explained in terms of more tangible factors. For this reason, it is important to address the concept of culture and explain how it can be interpreted. Most definitions of culture tend to fall within

two categories; those that define culture as being objective (explicit) in nature or subjective (implicit). Triandis (1994) defines objective culture as representing the tangible aspects of a society, such as tools, roads, and overt behaviours. Conversely, subjective culture refers to the mental processes shared by a group of people, resulting in similar beliefs, values, and norms (Bock, 1994; Schwartz, 1997). As our research compares the behavioural intention of consumers to adopt m-banking across two countries, Thailand and Australia, we adopt a subjective perspective.

There is strong empirical support for studying between-country cultural differences on a national level (Smith & Schwartz, 1997; Steenkamp, Hofstede, & Wedel, 1999). Studies have confirmed that, despite the increased globalisation and standardisation of international markets, cultural values of a nation remain consistent (Hofstede, 2007; Soares, Farhangmehr, & Shoham, 2007; Zhang, Beatty, & Walsh, 2008) and that the national culture of a consumer can influence their decision making process. Therefore, a person's intentions and behaviours are not affected only by their makeup, but also by the norms and beliefs of their environment (Triandis, 1989) . Indeed, sociologists argue that group-level variables have effects over and above the characteristics of group members (Erbring & Young, 1979).

A country's national culture has been identified as a key reason for explaining differences in consumer behaviour and perception of service (Malhotra, Ulgado, Agarwal, Shainesh, & Wu, 2005; Zeithaml, Parasuraman, & Malhotra, 2002). Accordingly, it is important for marketers of global banking services to understand the influence of national culture on the adoption of mobile services (Herbjørn, Pedersen, & Helge, 2005; Park & Jun, 2003). This two-nation study in hand addresses this gap by examining intentions to use m-banking services across two distinct national cultures; Australia; and Thailand.

Model development and hypotheses
Our core focus is on establishing a foundational model that is also able to investigate the impact of national culture on the relationship between hypothesised predictors and inhibitors with intention to adopt m-banking. Figure 1 below sets out our foundational model. We then move to test the absence of invariance of our hypothesised model in Australia and Thailand.

Figure 1. Proposed m-Banking Intention to Use Model
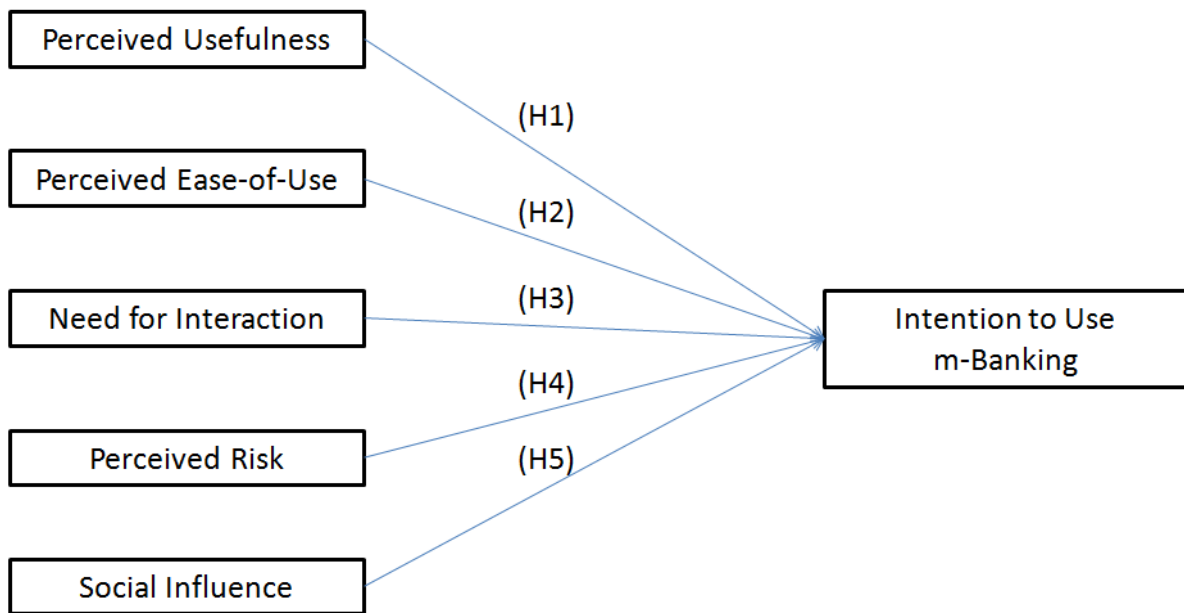
Within TAM, an m-banking customer's intention to adopt can be explained by two major factors: *perceived usefulness* and *perceived ease of use*. Perceived usefulness (PU) is the subjective probability that using a technology will improve the way a user completes a task (Curran & Meuter, 2005), and earlier studies suggest that PU positively influences m-banking adoption (Nysveen, et al., 2005; Wessels & Drennan, 2010). In this context, it is claimed PU is a significant predictor of intention to use (Yi-Shun, Yu-Min, Hsin-Hui, & Tang, 2003). Therefore, we hypothesise;

H1: *Perceived usefulness* (PU) has a positive impact on *intention to use* (ITU) m-banking.

SST studies suggest that 'easy to use technologies' are more likely to be adopted than technologies that are difficult to use (Chemingui & lallouna, 2013). Further, the perceived ease-of-use (PEOU) of technology is claimed to be an important predictor of m-banking adoption (Srite & Karahanna, 2006). Therefore, we hypothesise;

H2: *Perceived ease of use* (PEOU) has a positive impact on *intention to use* (ITU) m-banking.

Our model includes two additional antecedent beliefs, *need for interaction* (NFI) and *perceived risk* (PR). NFI is defined as the desire to retain personal contact with others during

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a service encounter. With a foundation in social interdependence theory, NFI indicates that if a customer perceives an interaction is important within the service encounter, they may be less inclined to use the SST option (Reinders, Dabholkar, & Frambach, 2008). As banking services have traditionally been 'high touch' and 'low tech' (Lovelock, Wirtz, & Keh, 2002), customers who develop personal relationships with their banking providers may be less likely to use m-banking (Prompattanapakee 2009). Therefore, we hypothesise;

H3: *Need for interaction* (NFI) has a negative impact on *intention to use* (ITU) m-banking.

Perceived risk (PR), is the consumer's belief regarding the likelihood of suffering a loss in pursuit of a goal (Pavlou, 2003). Research suggests that highly personalised and context-based technology, such as m-banking, carries an inherently higher perception of risk (Newell & Newell-Lemon, 2001). As m-banking is both information lean and mobile, this creates higher levels of uncertainty and risk perceptions (Kim, Shin, & Lee, 2007; Toh, Govindan, Chong, Keng-Boon, & Seetharam, 2009). Recent research in m-commerce (Wu & Wang, 2005) and m-banking (Chong, Chan, & Ooi, 2011) have found an inverse relationship between perceived risk and intention to use. Therefore we hypothesise;

H4: *Perceived risk* (PR) has a negative impact on *intention to use* (ITU) m-banking.

In m-banking, social influence can be defined as being the degree to which a user perceives the importance of others in the decision to adopt an innovation (Chong, Darmawan, Ooi, & Lin, 2010). Research investigating the factors that predict m-service adoption have consistently shown that social influence plays a significant role (López-Nicolás, et al., 2008). Kleijnen, Wetzels & De Ruyter (2004) studied the adoption of wireless finance, finding that social influence was highly significant in predicting intention. With origins in internalization theory (Kelman, 1958) social influence measures any referent that an individual may see as important, including friends, family, the mass media, and the Internet (Venkatesh, et al., 2003). Therefore, it is hypothesised that;

H5: S*ocial influence* (SI) has a positive impact on *intention to use* (ITU) m-banking.

National Cultural Traits of Australia and Thailand

Attempts have been made to conceptualize the most appropriate dimensions for studying national culture (Bond et al., 2004; Leung & Bond, 1989). It is the framework initially developed by Geert Hofstede (1980) that remains the most widely used national cultural structure in psychology, sociology, management and marketing studies (Steenkamp, 2001). While originally studied in a work place environment, Hofstede's dimensions have now been linked to demographic, geographic, economic and political aspects of a society, a feature unmatched by competing frameworks (Kale & Barnes, 1992). The constructs, methodology and results of Hofstede's studies have been debated since they were first introduced. Various replication studies have sought to discredit the idea that a finite number of cultural dimensions can explain a concept as broad as 'culture'. However, a larger body of research has supported Hofstede's dimensions, particularly in international marketing. Schwartz (1994) conducted a multi-country cultural analysis, and found a high correlation between his findings and Hofstede's. Clark (1990) concluded that most cultural typologies converge to Hofstede's cultural dimensions (See Table 1). For this reason, our study uses Hofstede, Hofstede & Minkov's (2010) dimensions to identify samples (Australia and Thailand) with significantly different national cultures.

In examining Hofstede *et al* (2010) cultural dimensions, it is revealed that Australia and Thailand present inherent national cultural differences (See Table 1). We proffer that, across these two national cultures, this variance will be present in our model (Figure 1) and develop our argument and hypothesis below.

[INSERT TABLE 1 HERE]

Perceived Usefulness (PU) is defined as the degree to which a person believes that using a particular technology will improve their own performance (Davis, et al., 1989). It has been suggested that individualistic cultures, like Australia, tend to be more innovative (Hofstede, Hofstede, & Minkov, 2010) and thus more willing to adopt technology that may improve their individual performance. In contrast, more collectivist cultures like Thailand, may not perceive newer technologies like m-banking as useful (Gouveia & Ros, 2000). In relation to the perceived-ease-of-use (PEOU) of m-banking SST's, high uncertainty avoidance cultures, like Thailand, will seek to acquire sufficient knowledge of the technology before adopting (Meyers-Levy, 1989). Uncertainty avoidance is defined as the degree to which members of society feel uncomfortable with ambiguity (Hofstede, et al., 2010). Following this logic, and

the low current uptake of m-banking in Thailand, it is proffered that Thai users, unlike Australian users, may not perceive m-banking services as being easy to use (PEOU).

Need for interaction (NFI) is defined as the desire to retain personal contact with others during a service encounter (Dabholkar, (1992). Unlike individualistic cultures, collectivist cultures value strong relationships and interdependence (Triandis, 1995). Fisher and Beatson (2002) posit that the introduction of SSTs has removed the interpersonal interaction of traditional service encounters and could reduce adoption and satisfaction of new technologies. This suggests that highly collectivist consumers, as found in Thailand, may not adopt m-banking as they continue to desire interpersonal interaction (Donthu & Yoo, 1998).

Perceived risk (PR) is the consumer's belief regarding the likelihood of suffering a loss in pursuit of a goal (Pavlou, 2003). Researchers have found that perceive risk varies across different national cultures (Agarwal, et al., 2009; Hsee & Weber, 1999). As m-banking is information-lean and mobile, it is argued that these characteristics may influence how *risky* consumers perceive m-banking to be (Kim, et al., 2007; Toh, et al., 2009) and that people from countries with high levels of uncertainty avoidance, such as Thailand, maybe less likely to adopt new technologies. Similar effects have been found by Hasan et al (1999), Straub et al (1997), Straub and Vance et al (2008).

Finally, studies found that collectivism-individualism has a noticeable effect on social influence (Ho, 1979; Hsu, 1981; Ng et al., 1982; Singh, Huang, & Thompson, 1962). In m-banking, social influence (SI) is defined as the degree to which an individual is influenced by others to adopt an innovation (Chong, Darmawan, et al., 2010). People from individualistic cultures, like Australia, are more likely to pursue any interest, regardless of whether this intention has only been formed in private without consultation of others (Parsons & Shils, 1951). Conversely, individuals from collectivist cultures are more likely to adopt a service if it aligns with the common interests of their community. Therefore, in respect to the above arguments, it is hypothesised that;

H6: The hypothesised model will be non-invariant across Thailand and Australia.

Method

The samples were drawn from two panels based in Thailand and Australia. A screening question identified respondents' prior knowledge with m-banking applications and respondents were incentivised through the collection of points. Like previous studies of mobile services, a web-based questionnaire survey was employed to collect data from 348 respondents, split across Thailand (n=175) and Australia (n=173) (Constantiou, Damsgaard & Knutsen, 2006). This method offered flexibility, ease-of-use and enabled the researchers to reach large and dispersed samples (Epstein, Klinkenberg, Wiley & McKinley, 2001; Albaum, Roster, Wiley, Rossiter & Smith, 2010; Evans & Mathur, 2005). Moreover, their anonymous nature reduces social desirability bias (Epstein et al., 2001). Respondents were aged 18 and over, living in urban centres in Australia and Thailand and were aware of the availability of m-banking services. The questionnaire was initially developed in English; using previously validated scales (see Table 2).

To ensure Thai respondents could understand the scale items, the questionnaire was translated into Thai, and then back-translated into English by two bi-lingual university academics independent of the study (Hult et al., 2008; Van de Vijver & Leung, 2000). Both academics evaluated the appropriateness of the questionnaire items and cultural relevance of the constructs to ensure functional equivalence (Jones, Lee, Phillips, Zhang, & Jaceldo, 2001). Each item was operationalized using a numerical seven point Likert-type scale; from (1) "Strongly Agree" to (7) "Strongly Disagree" to reduce measurement error due to different scaling of established constructs (Smith, 1988). Following translation of the scale items, a pre-test determined both questionnaires displayed functional equivalence.

[INSERT TABLE 2 HERE]

Results

Sample characteristics

The demographic breakdown of the Australian and Thai samples, shown in Table 3, resembled their respective populations (ABS, 2010; NSO, 2004).

[INSERT TABLE 3 HERE]

Prior to testing the hypotheses, we performed exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) on both the data sets (Child, 1990; Gardner, Johnson, Lee, & Wilkinson, 2000; Kelloway, 2006). The EFA for the Thai and Australian samples revealed that the survey items loaded onto their anticipated latent factors (See Table 4) (Field, 2005). Both the data sets yield a KMO measure of 0.71 or above. For Bartlett's Test of Sphericity Significance, the datasets yield a $p<.001$, which indicates that sufficient correlations exist among the variable to proceed with factor analysis (Hair et al., 2006, p. 105). Communalities were then examined and found to be at acceptable levels i.e. above 0.25 (Hair et al., 2006). All factors pertaining different items in each data set explain above 61% of the total variance, this satisfies the minimum 60% recommended by Hair et al. (2006). The variables were then allocated to each factor by using a pattern matrix, demonstrated from Table 4 for each set of questions. After observing the pattern matrix, the variables were allocated to the factors they loaded highly on.

[INSERT TABLE 4 HERE]

The CFA on the datasets used only the items and underlying structure found to be reliable and valid from the Thailand and Australian samples (See Table 4). Therefore, the model produced in the CFA was anticipated to be the final model to be used in further analysis for both samples (Karjaluoto, Mattila & Pento, 2002; Hooper, Coughlan, & Mullen, 2008). Psychometric properties of the constructs were evaluated by conducting a CFA using AMOS 18 on both the data sets. The fit of the CFA for the studies conducted both in Thailand /Australia is acceptable, with $\chi2= 187.811/202.466$, df= 105/105, $\chi2/df = 1.789/1.928$, (p < .01), comparative fit index (CFI) = 0.954/0.964, standard root mean square residual (SRMR) 0.061/0.050, Incremental fit index (IFI) =0.955/0.964 and root mean square error of approximation (RMSEA) = 0.062/.073. Considering all these goodness of fit measures, the model is an adequately suitable fit to the data from both the samples. Table 5 shows that composite reliability scores of all constructs, with the exception of *Need for interaction (.68),* were above than the recommended cut-off i.e. 0.70, demonstrating good reliability (Nunnally & Bernstein, 1994).

[INSERT TABLE 5 HERE]

Table 5 demonstrates that all item loadings are significant (p < .01), in support of convergent validity (Gerbing & Anderson, 1988). Additionally average variance extracted of PU, PEOU, NFI, PR and SI was above than the recommended 0.50, confirming convergent validity of respective scales (Fornell & Larcker, 1981). Average variance of each construct, with the exception of NFI for the Thai dataset, was greater than its shared variance with any other construct suggesting discriminant validity for each construct (Fornell & Larcker, 1981). Inspection of inter-factor correlation matrix revealed (see Table 6) very low correlations between all constructs, demonstrating constructs' discriminant validity.

[INSERT TABLE 6 HERE]

Path Analysis

In order to test the effects of predictors on *intentions to use* (ITU) m-Banking, the relationships were modelled and tested using Amos 18 (Table 7). The adequacy of this structural model was evaluated by fit indices which suggested that the structural model displayed good model fit to each of two data sets (Thailand /Australian) with $\chi 2$ (105)/(105) = 187.811 /202.466 (significant at p<.001), CFI = 0.954/0.964, NFI = 0.903/0.928, IFI =0.955/0.964, SRMR=0.580 /0.050and RMSEA = 0.623/0.0540. Path analysis reveals that the *Perceived Usefulness* (PU) of m-banking relates positively to *Intentions to Use* (ITU) for both Thai (β = .216, *p* = <.05) and Australian (β = .354, *p* =. <.001) consumer, therefore, H1 is supported. *Perceived Ease of Use* (PEOU) of m-banking relates positively to *Intentions to Use* (ITU) by consumers in Thailand (β = .231, *p* = <.05), however, there was no significance between PEOU and ITU by Australian users, (β = .037, *p* =<0. 545), therefore, H2 is partially supported for the Thailand sample only. *Need for Interaction* (NFI) and ITU m-banking is not significant for either Thailand (β = .046, *p* = .525) or Australia (β = .005, *p* = .935), therefore, H3 is not supported. The relationships between *Perceived Risk* (PR) and ITU m-banking in Thailand (β = -.154, *p* = <.05) and Australia (β = -.447, *p* = <.001) are significant and indicate a negative relationship, as such H4 is supported. Finally, *Social Interaction* (SI) and ITU is not significant (β = .068, *p* = .303) for the Thai sample, but is significant in Australia (β = .205, *p* = <.001), accordingly, H5 is partially supported for the Australian sample only.

[INSERT TABLE 7 HERE]

*Measurement and Path invariance tests*

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In order to test H6 pertaining to path *invariance* across two national cultures, a multi sample analysis for measurement invariance was conducted to establish invariance across both samples. The significant results from the Chi square difference ($\Delta\chi^2$) between the unconstrained model and constrained model ($\Delta\chi^2$= 357.658, df. =18; p=.001) indicated that there were non-equivalent parameters across the Thailand and Australian samples. The measurement invariance was subsequently used to test for the equality of structural covariances and factor variances. The results demonstrated the difference in Chi square between the constrained and unconstrained model for the structural covariances ($\Delta\chi^2$ =29.21, df.=14; p=0.01<.05) to be significant, thus indicating that the structural covariances were non-equivalent across both samples; accordingly, H6 is accepted. As a further assessment, non-significant paths were first removed from the unconstrained models for both Australian and Thailand samples. A constraint was applied to each path to get a new chi square. Any chi-square (after constraining a relationship between the constructs) more than the calculated threshold (399.28 for 95% confidence interval) will be variant for a path by path analysis. Results indicate that for Australian and Thailand sample, national culture does moderate the path from *perceived risk* (PR) (χ^2(215)= 410.841>399.28) and *social influence* (SI) (χ^2(215)= 400.676>399.28) to *intention to use* (ITU) m-banking in Thailand and Australia. However, culture does not moderate the path between *perceived usefulness* (PU) and *intention to use* (ITC) m-banking in Thailand and Australia.

Final models

Analysis of the Thai sample revealed the variance explained (R^2) was 23.8%, slightly higher than our hypothesised five construct model, justifying the exclusion of the two constructs, NFI and SI. The variance explained by this model is approximately the same amount as the original TAM (Davis, 1989). Given the exploratory nature of the study, and the study's objective of developing a foundational model, this provides a strong platform for future research.

[INSERT CFA (Thailand) HERE]

Figure 2: Final Model – Intention to Use m-Banking – Thailand Sample
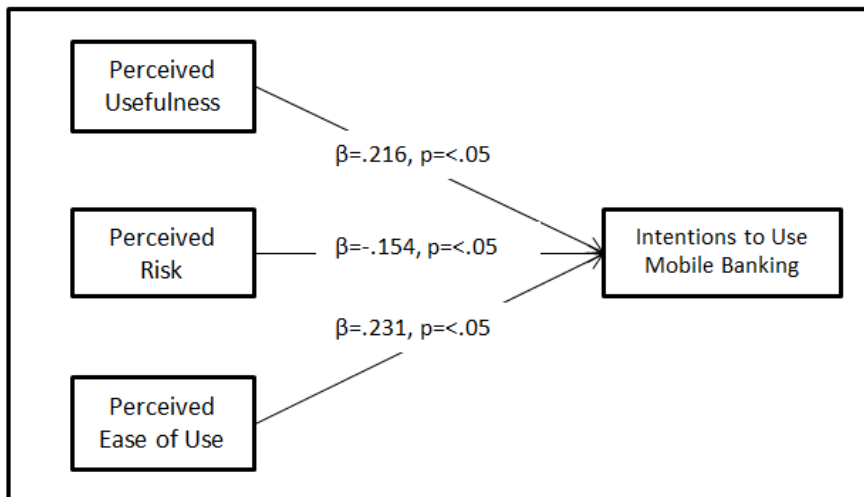
The revised Australian model accounted for 59.3% of variance explained in consumer intention to use m-banking in Australia. This is slightly higher than our hypothesised model, which had again two extra constructs (PEOU, NFI), justifying the removal of these two, non-significant predictors. This variance is similar to that of Curran & Meuter (2005) who found that their mode accounts for approximately 58%. However, this model is able to achieve this result with one less construct, indicating greater parsimony.

[INSERT CFA (Australia) HERE]

Figure 3: Final Model – Intention to Use m-Banking – Australian sample
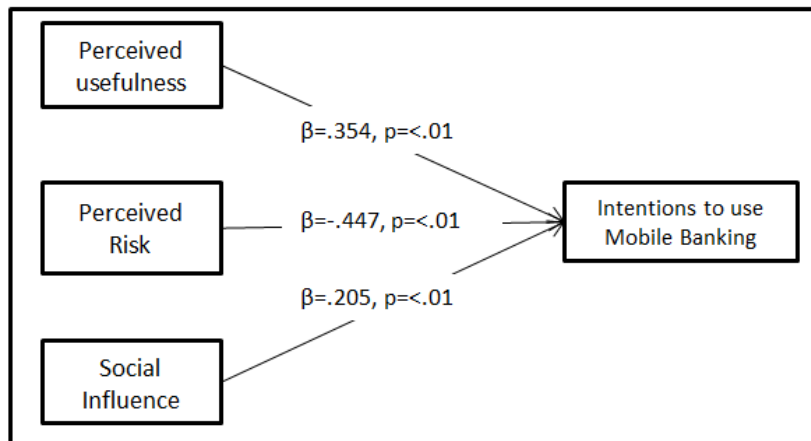
Discussion

There were two overarching research questions that prompted this study. First, what are the key motivators and inhibitors that influence consumer intentions to use m-banking services?

Second, do the motivators and inhibitors of m-banking use differ between predominantly collectivist (Thai) and individualistic (Australia) national cultures?

Perceived Usefulness

We hypothesised for the Thai sample that *perceived usefulness* (PU) would have a positive impact on *intention to use* (ITU) m-banking services. The results of this study are consistent with other research (Arvidsson, 2014; Gefen & Straub, 2000; King & He, 2006; Luarn & Lin, 2005; Pavlou, 2003; Venkatesh, et al., 2003) with PU significantly predicting ITU m-banking in Thailand. This was the same for the Australian sample. Studies have concluded that m-services applications like m-banking have unique characteristics when compared to other SSTs, such as ubiquity and immediacy, that allows users to retrieve information immediately (Toh, et al., 2009). Our results posit that the PU-ITU relationship was not significantly statistically different between Thailand and Australia. Indeed, a variety of studies have confirmed that PU is an important predictor of m-services adoption in both Asia and the West (Gefen & Straub, 2000; Lu, Yu, Liu, & Yao, 2003; Luarn & Lin, 2005; Toh, et al., 2009; Yousafzai, Foxall, & Pallister, 2010). The results indicate that consumers are likely to adopt a service when they can see the relative advantages and given that m-banking is a personal SST, it seems unlikely that m-banking would be adopted unless consumers perceived it as being useful (Arvidsson, 2014; Davis, 1989, Toh *et al.*, 2009). We propose with most countries now having access to the same information regarding the benefits of new technologies like m-banking, less pronounced differences will occur (Eriksson, Kerem, & Nilsson, 2005).

Perceived Ease of Use

Regarding the key influences to using m-banking for the Thai sample, it was confirmed that *perceived ease-of-use* (PEOU) had a significant positive impact on behavioural intentions. This view is consistent with prior studies of m-services in Asia (Liao, Tsou, & Huang, 2007; Moon & Kim, 2001). For the Australian sample, no significant relationship existed, which is not entirely unexpected as this result is supported by an alternative body of literature (Adams, Nelson, & Todd, 1992; Constantiou, Damsgaard & Knutsen, 2006; Davis, 1989; Wessels & Drennan, 2010). For example, Straub et al (1997) found that PEOU was not significant in Japan, the United States or Switzerland. Constantiou, Damsgaard & Knutsen (2006) suggested that PEOU had not become 'unimportant', but simply 'taken for granted' as mobile phone users had become more proficient. Perhaps Australians, who have more experience

with m-banking and other mobile technologies did not need an easy to use format, and were moving on to more complex systems. We further hypothesised that national culture would act as a moderator for relationships between the predictor (PEOU) and *intention to use* (ITU). The results, however, demonstrate national culture was not a significant moderator. A review of the rich body of mono-cultural TAM research in both the West and the East also found inconsistent conclusions as to the significance of PEOU in technology adoption (Chismar & Wiley-Patton, 2003; López-Nicolás, et al., 2008; Luarn & Lin, 2005; Moon & Kim, 2001). Srite and Karahanna (2006) proposed that masculinity and feminine cultures may differ in the impact of perceived ease of use and intention to adopt technology, yet their study demonstrated that there was no significant difference on the relationship between ease of use and intention to adopt technology. We argue that if national culture did moderate the PEOU-ITU relationship, there would be clearer differences between countries with varying cultural dimensions. Following this logic and the results of this study we conclude that national culture does not moderate the relationship between ease of use and intention to use m-banking.

Need for Interaction

We hypothesised that there would be a negative impact between a *need for interaction* (NFI) and *intention to use* (ITU) m-banking. It was expected that as m-banking is a relatively new concept in Thailand, customers would still prefer face to face interactions (Asher, 1999; Robinson, 1995; Trappey & Trappey, 2001) and that in removing that interaction Thai consumers may be less likely to adopt m-banking (Jarvenpaa & Staples, 2000). Surprisingly, our results did not support these previous findings. To help explain these results, Thai banks have been recently exploring new ways to move low-value transactions away from labour intensive branch counters to ATM networks, telephone and the Internet (Chudasri, 2002), resulting in Thai citizens becoming more comfortable with SSTs. It has been identified that the more familiar consumers are with online banking and SSTs, the less weight they put on social contacts (Karjaluoto et at, 2002). Need for Interaction was also not found to have a significant influence of ITU m-banking in Australia. Initial studies in Australia suggested that a reduction in face-to-face interactions may dissuade consumers from switching to SSTs, however, the current research adopts the view that given the long-term presence of SSTs in the Australian banking context, a societal norm has emerged (Wessels & Drennan, 2010). We also hypothesised that there would be a statistically different impact of NFI on ITU m-banking between cultures. The findings of this study do not support that conclusion and are

disparate to early cultural dimension literature. This suggests that ATMs and Internet banking have now been prevalent in consumer's lives for more than two decades, and therefore consumers are ready to adopt such technologies (Cheng, Lam, & Yeung, 2006; Jaruwachirathanskul & Fink, 2005). For that reason, national cultural differences do not moderate the relationship.

Perceived Risk

This study confirmed that *perceived risk* (PR) does have a significant and negative impact on *intention to use* (ITU) m-banking for both Thai and Australian consumers. As m-banking is both information lean and mobile, and is likely to have higher levels of uncertainty (Arvidsson, 2014; Kim, et al., 2007; Toh, et al., 2009). Consumers continue to be wary of the security and privacy threats that electronic commerce purportedly pose to them (Hoffman, Novak, & Peralta, 1999; Lee, McGoldrick, Keeling, & Doherty, 2003). In a study of 368 Taiwanese online banking users, all dimensions of PR were identified as being negative factors for adoption (Lee, 2009). We also examined whether national culture acts as a moderator between PR and ITU m-banking. Perceived risk in m-services is considered to have cross-cultural variation (Park & Jun, 2003), in particular, when financial risks are involved (Weippl, 2001). The results of this study are consistent with these findings, with Thailand and Australia having statistically significant variations in PR. While Thai consumers still consider risk to be important when considering adopting m-banking, it was a more significant inhibitor to adoption in Australia. Although this may seem surprising given that Thailand represents a high uncertainty avoidance culture, there is a robust explanation for the results. Hsee and Weber (1999) argue that people in socially-collectivist cultures tend to choose riskier options than those in individualist cultures. They posit that a 'cushion effect' is in effect in collectivist cultures, where family or other members will help out any group member who loses a lot of money after selecting a risky option (Hsee & Weber, 1999). These findings were corroborated by Teo and Liu (2007) who found that collectivist consumers were less risk adverse in China than in the United States. This aligns with the results of our study.

Social Influence

Our study did not find that *social influence* (SI) impacted intention to use (ITU) m-banking in Thailand. While literature posits that collectivist cultures are socially oriented and value the opinions of the group offer more than themself (Hsu, 1981; Ng, et al., 1982), there have been

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inconsistent findings regarding the relationship between subjective norms and intention in technology acceptance literature. For example, Davis *et al.*, (1989) originally found that subjective norms had no significant effect on intention and therefore it was omitted from the original TAM. Similarly, Curran and Meuter (2005) precluded it from their SST Intention to Use Model. In contrast, more recent literature has suggested that social influence may act as a predictor of intention to adopt technology (Im, Hong, & Kang, 2011; Min, Ji, & Qu, 2008). We consider that m-banking is a personal application and that Thai consumers may be less likely to consider the advice of their peers and social groups. For Australian consumers, it was determined that social influence had an impact on intention to use m-banking. This finding has been corroborated by other research (Carlsson, Carlsson, Hyvonen, Puhakainen, & Walden, 2006; Carlsson, Hyvonen, Repo, & Walden, 2005). Lastly, it was posited that the relationship between social influence and intention to use m-banking would be statistically significantly different in Thailand and Australia. The results of this study are consistent with this hypothesis.

Theoretical and managerial implications

It has been argued that existing user acceptance models still have room for improvement, as a result of their limited explanatory powers and inconsistent relationships, leading to additional factors being taken into account (Sun & Zhang, 2006). Our study is perhaps the first to examine the acceptance of m-banking in Thailand, and responds to calls for additional research that generalises m-banking and m-services acceptance across national cultures (Agarwal, et al., 2009; Dahlberg et al., 2008; Laukkanen & Kiviniemi, 2010; Wang, et al., 2012). Further, we employ Hofstede's (2010) cultural dimensions to identify two countries with different national cultural dimensions in order to test the SST Intention to Use Model, finding that the model constructs do not hold across diverse national cultures. As such, this study has proposed and validated additional constructs that are not present in the original SST Intention to Use model. Specifically, in an Australian context our study confirms that the re-inclusion of social influence into TAM2/TAM3 is justified, and which aligns with both original conclusions from TPB (Azjen, 1991) and more recent findings (Chong, Ooi, Lin, & Bao, 2012; Hsu & Lin, 2008; Toh, et al., 2009). Finally, this research has indirectly highlighted the importance of developing measurement scales that can be used in a global context (Cavusgil & Das, 1997; Malhotra, Agarwal, & Peterson, 1996). In summary, this study has furthered the understanding of technology acceptance literature by developing and

validating two theoretical models that explain and predict consumers' intention towards m-banking within an Australian and Thai context.

In a rapidly changing service environment where organisations must understand how to successfully implement new technologies, our study provides a number of insights for managers in the financial services industry. Studies have shown that the mere introduction of an e-payment or online banking service is not sufficient to attract users (Kim, Tao, Shin & Kim, 2010) and that it is vital for firms to provide consumer education programs (Karjaluoto et al, 2002). Banking organisations should also highlight the relative advantages of m-services and emphasise these aspects in promotional materials (Lee, McGoldrick, Keeling & Doherty, 2003). We identify the factors that consumers in diverse markets consider important when adopting m-banking, which should allow organisations to drive the adoption of m-banking in a more efficient manner. The findings of this research give financial institutions in Thailand and Australia a foundational model that can be used to justify the not only the implementation of m-banking services but also provide insights into marketing strategies that should be utilised when attempting to increase uptake of m-banking applications. Accordingly, these global banks may be more successful in driving uptake of m-banking services by segmenting countries by cultural dimensions as opposed to geographic locality (Laukkanen, 2007).

All research is subject to limitations that should be acknowledged. The conceptual model used in this study neither includes measures of attitude, nor actual usage behaviour. Several empirical studies have posited that attitude does not play a significant role in the adoption of technology (Chong, et al., 2012; Davis, et al., 1989; Venkatesh & Davis, 2000). Further, given repeated findings of a link between intention and behaviour, the decision not to measure actual usage behaviour is not a significant one (Park & Jun, 2003; Taylor & Todd, 1995; Venkatesh & Davis, 2000). Future researchers however, could extend the study's validated models to include actual usage behaviour. In addition, the actual variance explained by the study's model was higher in Australia than for Thailand. Therefore, we suggest future research could focus on exploring additional variables that could increase our understanding of mobile banking adoption in Thailand. Finally, the impact of culture in this study was tested by using secondary data from two countries and not by directly proposed hypotheses relating to specific cultural traits. Whilst this is regarded as the most cost effective way to conduct cross-cultural research, there are limitations associated with this method

(Soares, et al., 2007). As such, it would be interesting to re-test this model in other countries in order to strengthen the reliability. Alternatively, future work could adopt the structure proposed by Soares et al (2007), by proposing specific hypotheses relating to Hofstede *et al* (2010) cultural dimensions and testing these at an individual level.

In the immediate context, this study has furthered SST adoption literature by proposing models that are relevant to both Thailand and Australia, and arguably, countries sharing similar national cultural traits. It has also advanced cross-cultural studies of technology acceptance, an under-researched area. In a practical sense, this research provides insights previously not available for the financial services sector in both Thailand and Australia. It also has wider use, confirming to marketers and managers that national culture can influence the adoption of m-banking.

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Table 1: Cultural Dimensions of Major Western and Eastern Countries

Cultural Dimensions	Australia	United States	United Kingdom
Individualism-Collectivism	90	91	89
Uncertainty Avoidance	51	46	35
Power Distance	36	40	35
Masculinity-Femininity	61	62	66
Cultural Dimensions	Thailand	Indonesia	Vietnam
Individualism-Collectivism	20	14	20
Uncertainty Avoidance	64	48	30
Power Distance	64	78	70
Masculinity-Femininity	34	46	40

Source: Hofstede, Hofstede & Minkov (2010).

Table 2: Constructs and Pre-test reliability results

Proposed Construct	Source	Australian Sample		Thailand Sample	
		Literature α	Pre-Test α	Literature α	Pre-Test α
Perceived Usefulness	Curran & Meuter (2005); Luarn & Lin (2005)	.94	.80	.94	.82
Perceived Ease of Use	Luarn & Lin (2005)	.91	.80	.91	.75
Need for Interaction	Wei et al (2009)	.70	.78	.70	.79
Perceived Risk	Curran & Meuter (2005)	-	.95	-	.85
Social Influence	Featherman & Pavlou (2003)	.84	.81	.84	.91

Table 3: Sample Demographics

Demographic Features	Australian Sample (*n*)	Australian Sample (%)	Thai Sample (*n*)	Thai Sample (%)
Respondent Gender				
Male	89	51.45	87	49.71
Female	84	48.55	88	50.29
Respondent Age				
18 – 25	13	7.51	29	16.84
26 – 35	25	14.45	63	35.97
36 – 45	28	16.18	52	29.63
46 – 55	42	24.28	28	16.09
56 – 65	38	21.97	3	1.43
65+	27	15.61	0	-
Education Qualification				
No Education	0	-	0	-
Primary School	4	2.31	0	-
High School	68	39.31	43	24.66
Diploma	50	28.90	22	12.71
Bachelors Degree	36	20.81	99	56.68
Masters Degree	15	8.67	11	5.95
Current Income				
< 20,000	44	25.43	39	22.55
20,001 – 40,000	47	27.16	112	63.75
40,001 – 60,000	31	17.92	16	9.20
60,001 – 80,000	24	13.87	4	2.30
80,001 – 100,000	16	9.25	0	-
> 100,000	11	6.36	4	2.20

Note. [a] Income was originally measured in Thai Baht (THB) then converted to Australian Dollars (AUD) at the rate of 30 THB to 1 AUD.

Table 4: EFA Analysis -Thailand/Australia sample

Item		Factors				
		1	2	3	4	5
PU1	Using mobile banking would improve my performance in conducting banking transactions.	.871/.979				
PU2	Using mobile banking would make it easier for me to conduct banking transactions.	.914/.923				
PU3	I would find mobile banking useful in conducting my banking transactions.	.859/.955				
PEOU1	Learning to use mobile banking would be easy.		.728/.893			
PEOU2	I think mobile banking would be difficult to use		.708/.894			
NFI1	I enjoy seeing the people who work at my bank			.516/.825		
NFI2	Personal attention by the people at my bank is important to me			.693/.880		
NFI3	The people at my bank do things for me that no other machine could			.666/.788		
PR1	The mobile banking service might not perform well and create problems with my credit				.776/.801	
PR2	The security systems built into the mobile banking service are not strong enough to protect				.769/.854	
PR3	Mobile banking service systems may not perform well and process payments incorrectly.				.592/.813	
PR4	Using mobile banking services to pay my bills would be risky				.836/.916	
PR5	Using mobile banking services would add great uncertainty to my bill paying				.849/.912	
SI1	Friends' suggestions and recommendations would affect my decision to use mobile banking					.890/.901
SI2	Family members/relatives have influence on my decision to use mobile banking					.804/.892
SI3	Mass media (e.g. television, newspapers, articles, radio) will influence me to use mobile banking					.548/.858

(Thailand Sample – n=175, Australian Sample – n = 173)

Table 5: CFA – Thailand and Australian Sample

| Item Loading	Estimate (Thailand)	t-value	Estimate (Australia)	t-value	CR (Thailand)	CR (Australia	AVE (Thailand)	AVE (Australia)
Perceived Usefulness (PU)					**0.927**	**0.968**	**0.811**	**0.910**
PU1	.937	1	.945	1				
PU2	.980	29.247	.987	32.858				
PU3	.773	15.648	.929	24.812				
Perceived Ease-of-Use (PEOU)					**0.837**	**0.914**	**0.720**	**0.843**
PEOU1	.860	1	.973	1				
PEOU2	.838	12.122	.860	10.795				
Need for Interaction (NFI)					**0.683**	**0.870**	**0.420**	**0.692**
NFI1	.614	1	.793	1				
NFI2	.727	5.237	.887	11.817				
NFI3	.596	5.919	.814	11.168				
Perceived Risk (PR)					**0.890**	**0.941**	**0.618**	**0.762**
PR1	.737	1	.859	1				
PR2	.788	11.065	.770	12.694				
PR3	.745	10.493	.832	14.550				
PR4	.827	11.433	.930	17.795				
PR5	.831	11.465	.962	19.212				
Social Influence (SI)					**0.779**	**0.889**	**0.559**	**0.731**
SI1	.954	1	.945	1				
SI2	.744	6.707	.900	15.986				
SI3	.462	5.513	.702	11.108				

(Thailand Sample – n=175, Australian Sample – n= 173) All item loading are significant at p< 0.01 level
Where CR= Composite reliability, AVE= Average variance extracted

Table 6: Inter-factor Correlations

| Constructs	PU	PEOU	NFI	PR	SI	ITU
PU	1					
PEOU	0.484/0.728	1				
NFI	-0.108/0.233	-0.136/0.187	1			
PR	-0.54/-0.103	-0.487/-0.235	0.289/0.338	1		
SI	0.193/-0.013	0.05/0.021	0.091/0.113	0.021/0.078	1	
ITU	0.653/0.41	0.436/0.435	-0.15/0.095	-0.651/-0.21	0.266/0.063	1

(Thailand Sample – n=175, Australian Sample – n= 173) Where; NFI= Need for interaction, PEOU= Perceived ease-of-use, PU= Perceived Usefulness, PR=Perceived Risk, SI= Social influence, ITU= Intentions to use m-banking

CFA (Australia)
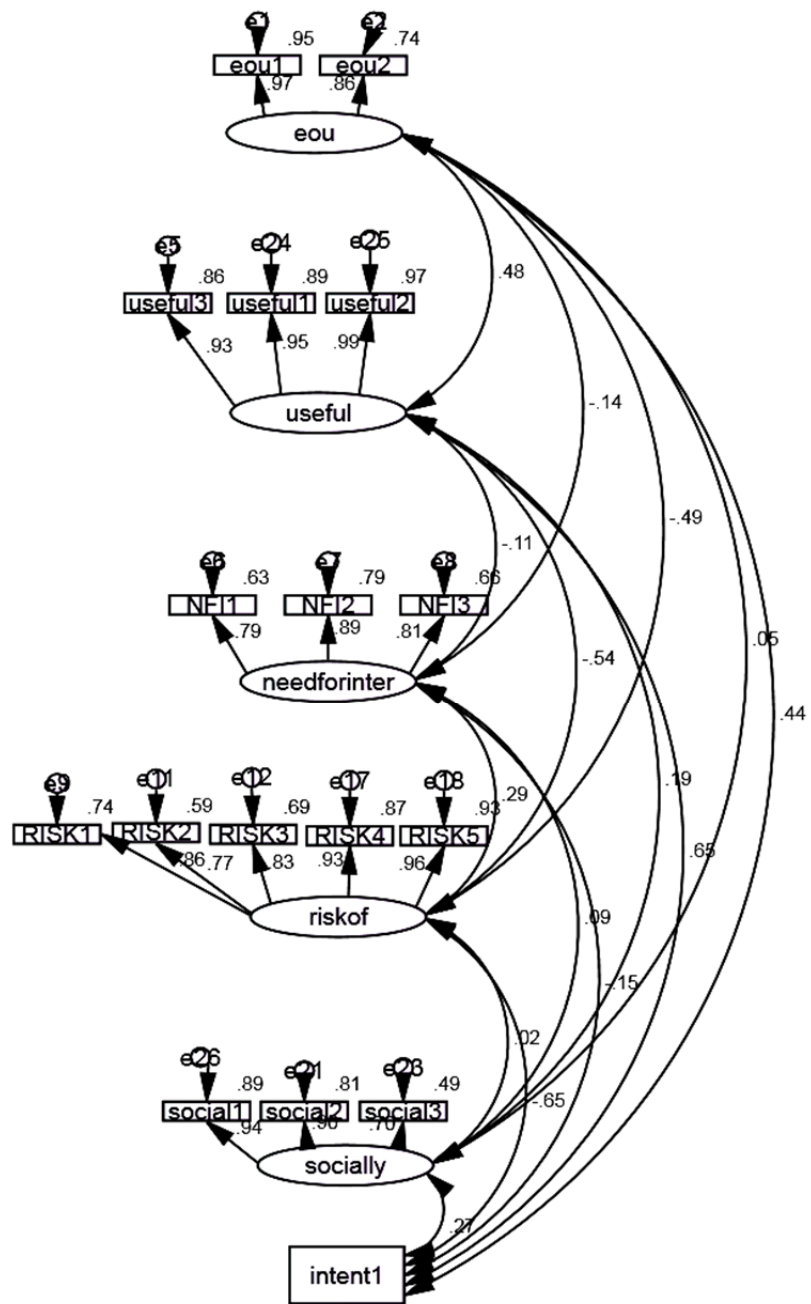
Where eou= PEOU (Perceived ease of use), useful= PU (Perceived usefulness),
needforint= NFI (Need for interaction), riskof= PR (Perceived risk), Socially=SI
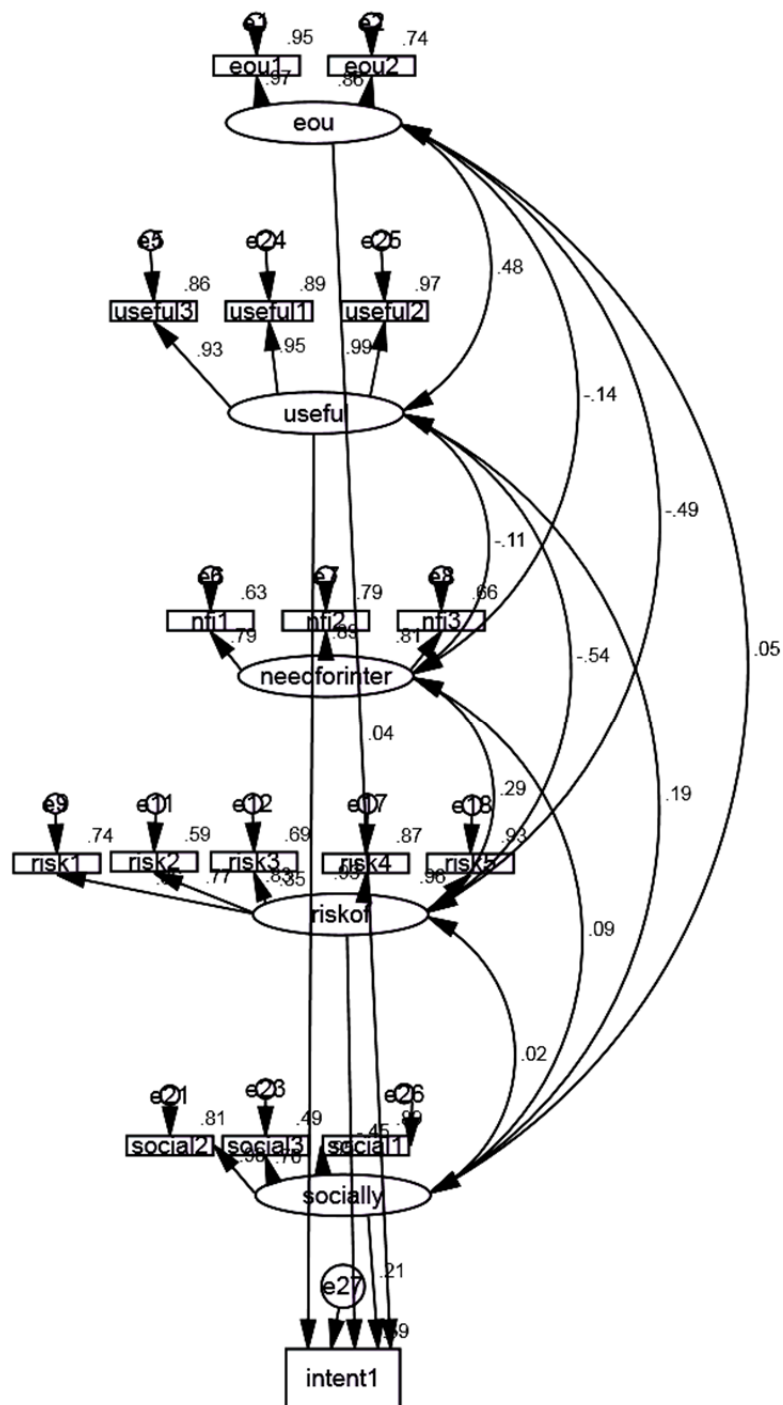(Social influence) and intent1=ITU (Intentions to use)

CFA (Thailand)
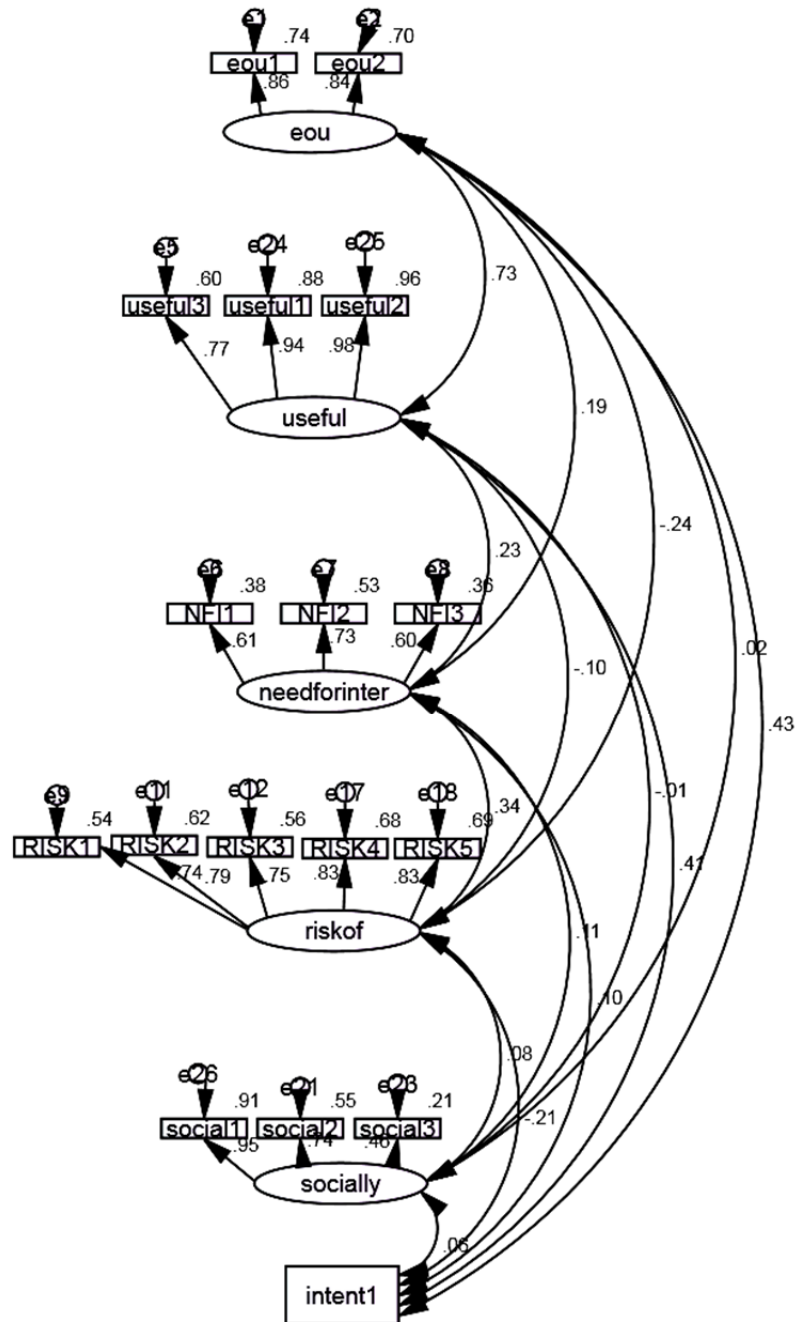
Where eou= PEOU (Perceived ease of use), useful= PU (Perceived usefulness), needforint= NFI (Need for interaction), riskof= PR (Perceived risk), Socially=SI (Social influence) and intent1=ITU (Intentions to use)
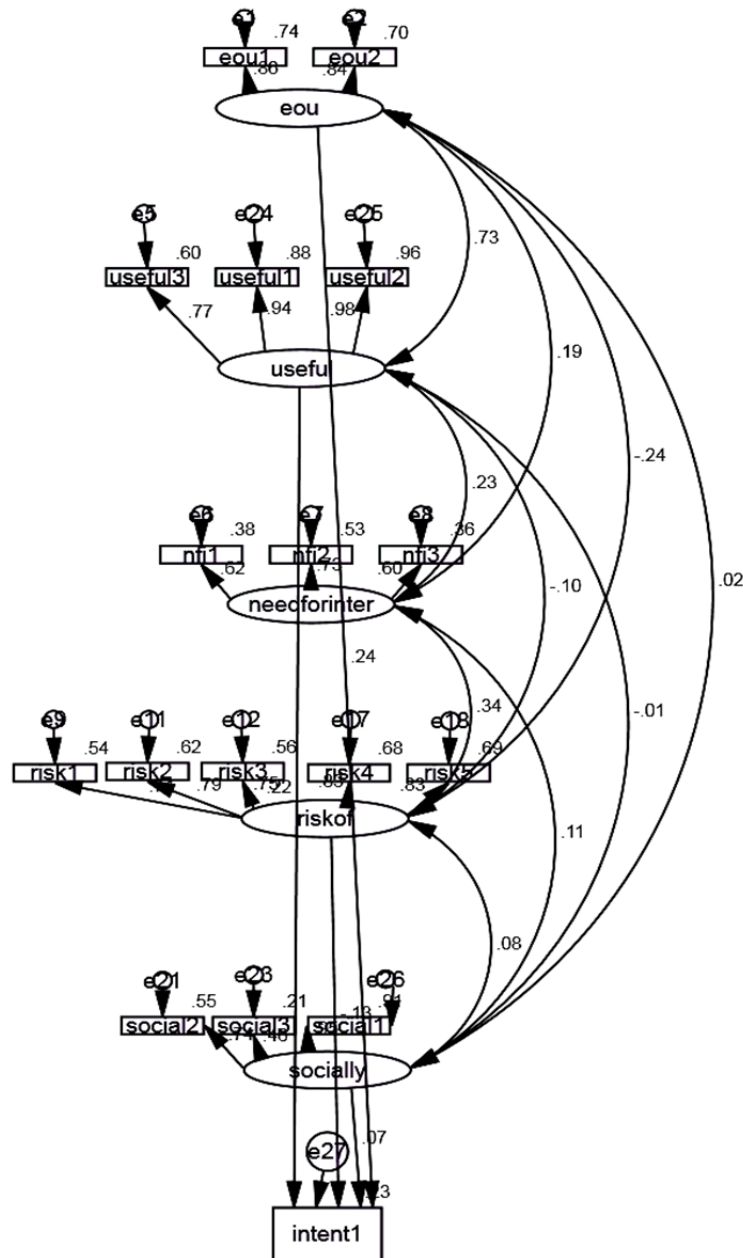
Table 7: Path analysis

Hypotheses	Thailand			Australia		
	Estimate	t-value	P	Estimate	t-value	P
H1: PU → ITU	.216	2.057	.04	.354	5.421	.00
H2: PEOU → ITU	.231	2.006	.04	.037	.605	.54
H3: NFI → ITU	.046	.525	.59	.005	.082	.93
H4: PR → ITU	-.154	-1.952	.05	-.447	-6.445	.00
H5: SI → ITU	.068	1.031	.30	.205	3.842	.00
Variance explained (R^2)	.238			.593		

Path Analysis (Australia)

Where eou= PEOU (Perceived ease of use), useful= PU (Perceived usefulness), needforint=
NFI (Need for interaction), riskof= PR (Perceived risk) and Socially=SI (Social influence)
and intent1=ITU (Intentions to use)

Path Analysis (Thailand)

Where eou= PEOU (Perceived ease of use), useful= PU (Perceived usefulness), needforint= NFI (Need for interaction), riskof= PR (Perceived risk), Socially=SI (Social influence) and intent1=ITU (Intentions to use)